

**WHAT IS CLAIMED IS:**

1. A digital transmission apparatus, which accommodates a plurality of terminals for exchanging asynchronous frames each including a MAC address, and is used for transmitting said asynchronous frames by putting each of said asynchronous frames in a synchronous frame, said digital transmission apparatus comprising:

an address table for storing an address of a group including said digital transmission apparatus;

a header-creating unit for creating a header including a communication-destination transmission-apparatus identification including said address of said group including said digital transmission apparatus;

a header-adding unit for creating a first frame by adding said header to data of an asynchronous frame received from any one of said terminals;

a frame-receiving unit for receiving a synchronous frame;

a distribution unit for extracting a first frame from a synchronous frame received by said frame-receiving unit, comparing a communication-destination transmission-apparatus identification included in a header of said first frame with said address of said group including said digital transmission apparatus and forming a

judgment as to whether to relay or accept said first frame in dependence on a result of comparison; and

a frame-transmitting unit for transmitting a first frame created by said header-adding unit or passed on by said distribution unit by putting said first frame in a synchronous frame.

2. A digital transmission apparatus, which accommodates a plurality of terminals for exchanging asynchronous frames each including a MAC address, and is used for transmitting said asynchronous frames by putting each of said asynchronous frames in a synchronous frame, said digital transmission apparatus comprising:

a MAC-address table for storing a MAC address of a terminal by associating said MAC address with an address of a group including a digital transmission apparatus accommodating said terminal and a node address of said digital transmission apparatus accommodating said terminal;

a MAC-DA-address-extracting unit for extracting a communication-destination MAC address set in a MAC header of an asynchronous frame received from any one of said terminals;

an address-detecting unit for searching said MAC-address table for a group address and a node address that

match said communication-destination MAC address;

an address table for storing said address of said group including said digital transmission apparatus and a node address of said digital transmission apparatus;

a header-creating unit for determining said address of said group including said digital transmission apparatus and a node address indicating a multiple-address communication in said group for a communication-destination MAC address indicating a multiple-address communication or for determining a group address and a node address that match a communication-destination MAC address for a communication-destination MAC address indicating a 1-to-1 communication and for setting said determined group address and said determined node address in a communication-source transmission-apparatus identification including a communication-source group address and a communication-source node address included in a header;

a header-adding unit for creating a first frame by adding said header to data of an asynchronous frame received from any one of said terminals;

a frame-receiving unit for receiving a synchronous frame;

a distribution unit for extracting a first frame

from a synchronous frame received by said frame-receiving unit, comparing a communication-destination transmission-apparatus identification included in a header of said first frame with said address of said group including said digital transmission apparatus and forming a judgment as to whether to relay or accept said first frame in dependence on a result of comparison; and

a frame-transmitting unit for transmitting a first frame created by said header-adding unit or passed on by said distribution unit by putting said first frame in a synchronous frame:

3. A digital transmission apparatus according to claim 2, further comprising a MAC-address-learning unit for storing a relation between a communication-destination MAC address and a transmission-apparatus identification on the basis of a communication-source transmission-apparatus identification and a communication-source MAC address, which are included in a first frame put in a synchronous frame received by said frame-receiving unit.

4. A digital transmission apparatus according to claim 2, further comprising an unsuccessful-search-case address table for storing an unsuccessful-search-case transmission-apparatus identification to be used when it

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is impossible to search for a group address and a node address, which correspond to a MAC address, wherein said header-creating unit uses a transmission-apparatus identification stored in said unsuccessful-search-case address table in case it is impossible to search for a group address and a node address, which correspond to a MAC address.

5. A digital transmission apparatus according to claim 2, wherein:

the total number of bits included in said communication-destination group address and said communication-destination node address is fixed;

there is further provided a group-mask table for storing a group-address mask pattern indicating the number of bits included in said communication-destination group address; and

said distribution unit forms a judgment as to whether to relay or accept a first frame in dependence of a result of comparison made after a communication-destination group address and a communication-destination node address, which are set in a communication-destination transmission-apparatus identification, are separated from each other by using said group-address pattern.

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6. A digital transmission apparatus according to claim 2, further comprising:

a filter table for storing information on transmission apparatuses not entitled to a communication service; and

a filtering unit for discarding a first frame when a transmission apparatus serving as a communication source is determined to be a transmission apparatus not entitled to a communication service as indicated by a result of searching said filter table on the basis of a communication-source transmission-apparatus identification, included in said first frame which is determined to accept by said distribution unit.

7. A digital transmission apparatus according to claim 4, wherein:

said unsuccessful-search-case address table is used for storing a transmission-apparatus identification indicating a broadcasting communication to all groups; and

said distribution unit determines to accept a first frame if a communication-destination transmission-apparatus identification of said first frame indicates said broadcasting communication.

8. A digital transmission apparatus according to

claim 2, wherein said first frame has a fixed length.

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